



The use of garlic extract (*allium sativum*) as an alternative to recover blood pressure and *malodialdehyde* (MDA) levels on mothers (post-partum)

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ABSTRACT

Background

Complication on post-partum is a part of 80% which causes maternal mortality as stated by World Health Organization. Hypertension case during childbed tends to increase. To prevent, maintain, and cure herbal supports security and health effect improvement. The side effect is lesser than conventional medicine. Garlic supplementation is correlated to blood pressure digression significantly on hypertension patient. *Malodialdehyde* (MDA) is production of lipid peroxide which contains aldehyde substance. It describes oxidative stress level as lipid peroxide biomarkers which can be prevented by antioxidant.

Objective

This research proved the administration of garlic extract could influence blood pressure recovery and MDA level of post-partum mothers.

Method

Quasi experimental with non-equivalent control group design took 28 participants as sample. They were divided into 2 groups consisting of 14 participants controlled by POR, 14 intervention participants with POR administered by garlic extract 681.6 mg. The sample was *consecutive sampling*. Data analysis used *mann whitney* statistic test continued by *friedman test* and *Post Hoc Wilcoxon*.

Findings

Blood pressure digressions of pre-post intervention average scores of 2 groups showed the first systolic measurement and third diastolic measurement. Systolic and diastolic blood pressure showed *p value* 0.000 and MDA level with *p value* 0.705. The total of blood pressure average of systolic group was 23.21 mmHg with *p value* 0.000. The diastolic was 7.22 mmHg with *p value* 0.016. The MDA showed lover score $-(50.64 \text{ nmol/mL})$ *p value* 0.705.

Conclusion and Recommendation

There was influence of garlic extract to blood pressure and there was no influence of garlic extract to MDA level.

Keywords: Garlic, Blood Pressure, *Malondialdehyde* (MDA), Post-Partum

INTRODUCTION

According to *World Health Organization* (WHO), there are 80% of maternal mortality caused by complication during pregnancy, childbirth, and post-childbirth. From all numbers of maternal mortality rate, 99% of them occurred in developing countries[1]. In Indonesia, the main causes of maternal mortality are hemorrhage and infection. Hypertension case also increases than hemorrhage and infection which have lower proportion. In 2013, >25% of maternal mortality in Indonesia was caused by hypertension[2].

Hypertension during childbed consisted of blood pressure before 20 weeks of gestational age called as chronic hypertension. It is caused by pregnancy or gestational hypertension and acute hypertension during childbed [3]. Medicine category - *Calcium Channel Blocker* is effective. For example nifedipine which is able to decrease blood pressure. However, there are several side effects caused by *myocard ischemia*, hypotension, and peripheral edema[4]. The side effects of herbal medicine are lesser than conventional medicines. Therefore, the use of non-pharmacology medicine is saver than pharmacology medicine.

Medicine administration for postpartum hypertension could have effects, such as nausea, headache, abdominal pain and even excretion of breast milk. Previous studies showed that consuming garlic could influence blood pressure digression on hypertension patients[5]. *Malodialdehyde* (MDA) is lipid peroxide product containing aldehyde substance. It describes stress level. An oxidant is usually administered as biological biomarker of lipid peroxide. Lipid peroxide could be prevented by antioxidant [6]–[8].

Previous findings showed garlic administration and black cumin powder significantly decreased MDA plasma level on postmenopausal women[9]. Therefore, the effect of garlic administration based on pathophysiology of this research has purpose to prove the use of garlic extract (*Allium sativum*) as an alternative of blood pressure and *malodialdehyde* (MDA) level of post-partum mothers at Bhayangkara Prof. Awaloedin Djamin Hospital Semarang.

Objectives

This research proved the administration of garlic influenced blood pressure and *malondialdehyde* (MDA) level recovery of post-partum mothers.

Methodology

This quasi experimental research with *non-equivalent control group design* took 28 post-partum mothers suffering hypertension as sample. They were grouped into control group (14 people) and experimental group (14 people). Blood pressure measurement used digital tensimeter. Meanwhile, *malondialdehyde* (MDA) was measured by ELISA MDA/microplate reader analyzer in laboratorial check up by using EL absience kit.

DATA ANALYSIS

The data analysis was used to analyze the differences in blood pressure digression and MDA level between two group pairs using *mann whitney test*. Meanwhile, to analyze the difference of blood pressure digression and MDA between before and after intervention of the teams used *friedman test* and *pos hoc Wilcoxon*.

Ethical Considerations

The ethical code was gained from ethical committee of health research in Universitas Sultan Agung Semarang with an ethical approval number is 077/B.1-KEPK/SA-FKG/V/2019

FINDINGS

Univariat Analysis

Table 1. Characteristics of the Respondents

Characteristics	Intervention Group (n=14)		Control Group (n=14)		*p
	N	%	N	%	
Age (mean±SD)	30,86±6,112		31,36±6,640		

Min-Max	21-40		20-40	0,296
<20 year old	-	-	-	-
20-35 year old	11	78,6	9	64,3
>35 year old	3	21,4	5	35,7
Parities				0,243
Primipara	6	42,9	4	28,6
Multipara	8	57,1	10	71,4
Grandemultipara	-	-	-	-
Previous Childbed History				0,137
Gestational Hypertension	2	14,3	3	21,4
Preeclampsia/eclampsia	-	-	2	14,3
Normal/absence	12	85,7	9	64,3
Labor History				0,187
Having complication	13	92,9	12	85,7
Not having complication	1	7,1	2	14,3
Nutrition				0,004
Over nutritious	8	57,1	11	78,6
Normal nutritious	6	42,9	3	21,4
Activities				0,363
Having activity/properly doing activity	5	35,7	7	50,0
Not doing activity/low activity	9	64,3	7	50,0

*Homogeneity

BIVARIAT ANALYSIS

The Garlic Extract to Systolic and Diastolic Blood Pressure of Post-Partum Mother on both Intervention and Control Groups

Variable	Pre Mean±SD	Post Mean±SD	p value
Systolic Blood Pressure			
Intervention	152,86±12,18	114,86±9,64	0,001 ^a
Control	145,57±13,02	130,79±8,08	0,001 ^a
Pvalue (n=28)	0,102^b	0,000^b	
	Intervention Mean	Control Mean	
Δ	38,00	14,79	0,000 ^c
Diastolic			
Intervention	90,14±7,7	72,21±7,48	0,001 ^a
Control	91,07±7,08	80,86±3,88	0,002 ^a
Pvalue (n=28)	0,596^b	0,002^b	
	Intervention Mean	Control Mean	
Δ	17,93	10,21	0,017 ^c

^b Mann Withney test ^a Wilcoxon test ^c t-Independent-test

Table 3. Average of Systolic Blood Pressure

Systolic Blood pressure	Intervention Group (mmHg)	Control Group (mmHg)
TD Pre	152,86	145,57
TD 1	150,07	141,43
TD 2	140,71	131,36
TD 3	130,50	139,00
TD 4	122,71	134,14
TD 5	129,86	121,57
TD 6	114,86	130,79
Differences TD1-TD6	38,00	14,78

The differences of systolic blood pressure digression average on both teams could be seen on Figure 1.

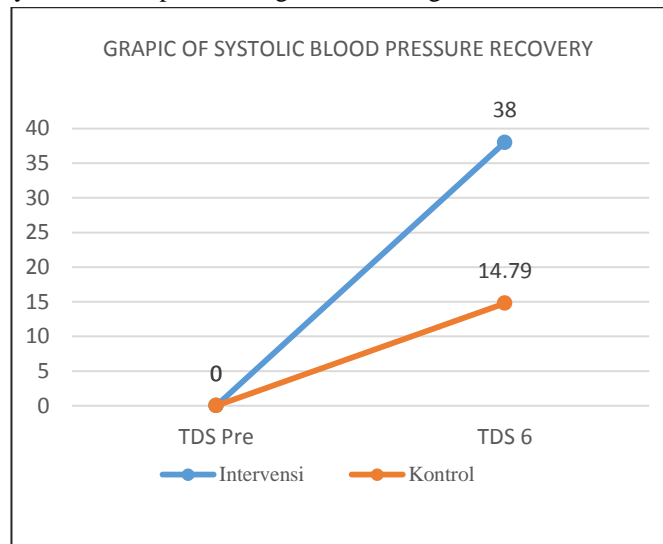


Figure 1 explains the digression with amount 38 mmHg of first measurement until sixth measurement of systolic blood pressure of intervention group after the intervention with 681.6 mg dose. Meanwhile, the average of systolic blood pressure on control group had deviation 14.79 mmHg. Thus, it is concluded that the deviation of systolic blood pressure was 23.21 on both groups.

Table 3. Average of Diastolic Blood Pressure

Diastolic Blood Pressure	Intervention Group(mmHg)	Control Group (mmHg)
TD Pre	90,14	91,07
TD 1	86,93	90,57
TD 2	81,71	86,71
TD 3	78,07	83,50
TD 4	82,43	78,64
TD 5	79,29	75,14
TD 6	72,21	80,86
Differences TD1-TD6	17,93	10,21

Differences of diastolic blood between intervention and control group

The average differences of diastolic blood pressure of each group can be seen on Figure 2.

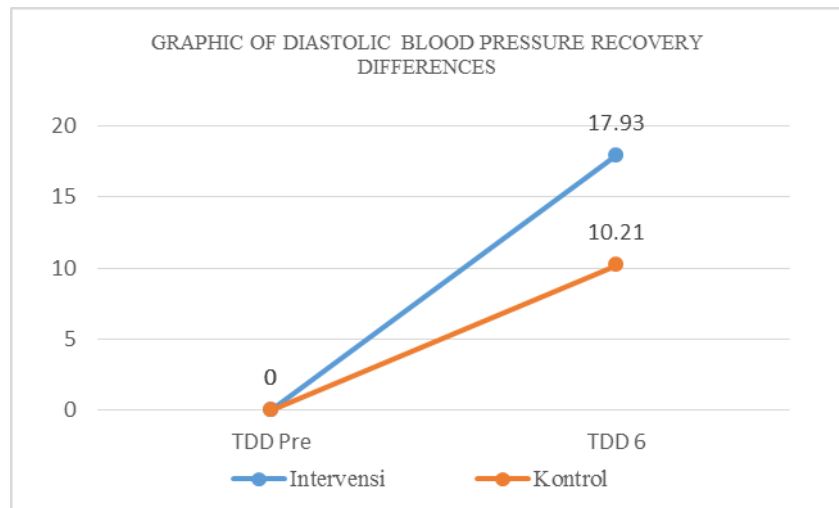


Figure 2 explains that the digression was 17.93 mmHg. The first until sixth measurements showed systolic blood pressure of intervention group. Meanwhile, the average of systolic blood pressure of control group had deviation 10.21 mmHg. It is concluded that there was significant and actual difference between blood pressure levels of both teams. The deviation of systolic blood pressure was 7.72 between the teams.

Result Differences of Malondialdehyde Level between Intervention and Control Groups

The differences of MDA level on pre and post intervention of each team can be seen on Table 4.

Table 4 explains that garlic extract influences to MDA level of intervention and control groups.

<i>Malondialdehyde level (MDA)</i>	Pre	Post	<i>P value</i>
	Mean±SD (ng/mL)	Mean±SD (ng/mL)	
Intervention	39,0±14,5	50,3±17,2	0,000 ^a
Intervention	238,86±131,89	491,36±551,83	0,451 ^a
Control	265,86±123,301	534,86±473,03	0,826 ^a
<i>Pvalue</i> (n=28)	0,124^b	0,124^b	
	Intervention Mean	Control Mean	
Δ	-27	-77,64	0,705 ^c

^bMann Withney test

^aWilcoxon test

^cFriedman test

The measurement of MDA before and after intervention for both groups had *p value* > 0.05. It meant there was no significant difference of the garlic extract to decrease MDA level of the groups.

The deviation of measurement results of MDA pre condition of intervention group was 238,86±131,89 ng/mL. Then, its post condition was 265,86±123,30 ng/mL. Meanwhile, the MDA pre condition level of control group had average deviation 491,36±551,83ng/mL and the post condition had average deviation 534,866±473,03 ng/mL with *p value* 0.124.

There was 27 ng/mL improvement of MDA level in pre-condition until post-condition of intervention group MDA level. Meanwhile, the average of MDA level in pre-condition of control group had deviation 77.64 ng/mL. It is concluded the average deviation of MDA level was 50.64 between intervention and control groups.

DISCUSSION

Based on the measurement, there were two terms – systolic and diastolic blood pressure. Theoretically, it has not been known the main cause of hypertension on post-partum mother. Thus, there is a need of further

investigation to detect and understand its etiologic to implement it. Therefore, hypertension of post-partum mother still becomes subject to be investigated. Post-partum hypertension is increasing blood pressure condition $\geq 140/90$ mmHg without proteinuria or *oedema* post-partum [10], [11].

Review of post-partum hypertension in this research was limited, focused on post-partum period (2-6 days) in describing patients' condition during inpatient. Then the data analysis is sent back again to the hospital due to suffer hypertension, preeclampsia, eclampsia, or other complication related to hypertension. Heretofore, the parturition case is considered as complex theory, neurologic influence, uterus circulation, nutrition and other factors causing parturition [12], [13]

Based on statistic test of the research done by Junaedi et al about garlic brew therapy which significantly decrease systolic and diastolic blood before and after intervention with *p value* 0.000. It means garlic was effective to decrease blood pressure [14].

Based on *mann withney* test during six day observation to monitor systolic blood pressure of intervention and control groups, it gained *p-value* from the first until sixth day $P < 0.05$. It meant that both teams had systolic blood pressure digression. Meanwhile, on blood pressure measurement showed there was no difference of diastolic blood pressure from the first until fourth day. The diastolic pressure showed $P < 0.05$ seen on day 2, 3, 5, and 6 for both groups. The substance of garlic became effective oxidant to remodel hypertension patients; arteries [15].

Previous studies stated that garlic had pharmacological effect. It had many components contained in garlic. It was not known for sure the dominant component influencing blood pressure. It needed certain substance separation technique which was based on observation to decrease systolic and diastolic blood pressure. That was by administering allicor with 600 mg/day dose [16]. The content of garlic had important roles to prevent cell and organ's destruction due to oxidation process [17]. Research dealing with this substance also showed bioactive substance as ingredient in pharmacological medicine or in health field, such as sesquiterpen [18].

Dealing with MDA level measurement between pre and post intervention of both teams, it gained *p value* > 0.005 . It meant there was no significant difference of garlic extract to decrease MD level for both groups. The deviation of MDA level of both groups were 238, 86 \pm 131,89 ng/mL and MDA level of post intervention 265,86 \pm 123,30 ng/mL. Meanwhile, the MDA levels of control group before intervention were 491,36 \pm 551,83ng/mL and MDA after intervention 534,866 \pm 473,03 ng/mL with *p value* 0,124.

There were many negative factors caused by free radiations. Based on the previous findings, the effect of garlic and black cumin significantly decreased MDA [9]. Oxidative pressure is an imbalance condition between cell antioxidant and higher cellular ROS level. Based on the findings done by Rini et al, they analysed chemical compositions of reminiscence leaves which contains oxidized sesquiterpen [18]. The present study about garlic has 15 top detected substances. They were known to produce oxidized sesquiterpen substance such as *cubenol*, *t-muurolol* and *á-cadinol*. The latest study found garlic had terpen substance on top detected substances, such as *guaiol*. In different research by Roberto and Burits, they reported that detected substances in several TBARS test methods as prevention of free antioxidant effect significantly [19], [20].

Garlic also contributes as antioxidant but it has smaller area extension percentage. The role of the substance is important since it has potencies to cure disease caused by reactive species which were excessively produced.

The non-pharmacological hypertension cure such as garlic has biological effect, such as an antioxidant. MDA as indicators of free radiation could be prevented by antioxidant [21]. However, free radiation could be also triggered by stress and excessive activities [22]. Research about this substance showed that bioactive substance as ingredient for pharmacy (medicine) or its uses in health such as sesquiterpen [18].

CONCLUSION

The administration of garlic could suppress blood pressure level of post-partum mother into normal condition. Meanwhile, based on this research, there was no different MDA level between pre and post condition of both groups.

FURTHER RECOMMENDATION

Active responses of childbed mothers in seeking and accessing health information could control hypertension occurrence and free radical exposures. Operationally, due to innovation found in this research with principle to add garlic extract could be an alternative of post-partum mothers' blood pressures. Besides that, it is expected for future researcher to pay attention in giving optimal dose and considering to use larger sample with longer investigation period. Furthermore, to control causal external factors such as stress due to psychological experiences of the mothers, could be expected to be investigated and reviewed completely.

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